## III. Streamlining

In this section, we discuss the standards for deregulation, broadly defined to include streamlined regulation. By "streamlined" regulation, we mean regulation such as afforded to CAPs, IXCs (other than AT&T), and to AT&T on most Basket 2 and Basket 3 services. Under streamlined regulation, the carrier:

- Has no band or basket constraints;
- Is free to deaverage rates, subject to the new rates' not being unjustly or unreasonably discriminatory;
- Has no price-cap constraints;
- Is *not* guaranteed the opportunity to earn a fair return on capital; and
- Has no obligation to share earnings with customers.

We believe that streamlining is justified in markets for discretionary services — apart from the state of competition. If the service is discretionary, customers always have the option not to consume the service. This market discipline ensures that prices cannot get too far out of line with costs.

We also believe that new services should be subject to streamlined regulation. Regulating such services clearly discourages innovation. Indeed, without the opportunity to earn high returns if new services are successful, the firm has no incentive to bear the risk inherent in new services. Furthermore, new services are generally discretionary. Indeed, consumers are often slow to adopt new services at all. Consequently, market forces can be relied upon to ensure reasonable prices.

Streamlined regulation is also justified where markets are effectively competitive. The remainder of this section discusses the appropriate regulatory standards (or metrics) for allowing streamlined regulation.

## A. Metrics — Entry Conditions

In economic terms, the key for effective competition is resource mobility. Market power is the ability to prevent expansion of supply. The more elastic the prevailing conditions of supply, the less profitable are price increases. A high elasticity of supply implies that even a small price increase will prompt a large output expansion by competitors. And this is true regardless of the prevailing distribution of market shares. Even a monopolist (*i.e.*, a single seller) cannot exercise any monopoly power if supply is sufficiently elastic.[23]

The elasticity of supply in a market is determined by a variety of factors, but of prime importance are conditions of entry into the market: In particular, are conditions of entry such that resources can, in timely fashion, be brought to bear to take advantage of any price increase? If there are legal barriers that prevent additional resources from being deployed or if access to critical resources is restricted or available only on an unfavorably discriminatory basis, entry will be more difficult than in the absence of such conditions. Indeed, entry may be impossible under such circumstances. If entry must be undertaken on a substantial scale relative to the size of the market and requires investments in specialized, nonsalvageable capital resources, entry will more difficult than in the absence of such conditions and may again prove to be impossible in some circumstances. If a market is populated by several suppliers with excess capacity or the ability to quickly expand existing capacity, expansion in market or into neighboring markets may be easier than in the absence of such conditions.

To the extent that important barriers to resource mobility and entry exist in a market, the market cannot be convincingly portrayed as effectively competitive (unless, of course, it is already characterized by a sufficient degree of competitive rivalry). While the FCC has taken very significant steps in ordering switched and special access interconnection, there remain a

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[23] *See* Paul A. Samuelson, *Foundations of Economic Analysis* (1947), p. 79. "[I]t is easy to show that under uniform constant costs the demand curve for a firm is horizontal even though it produces 99.9 percent of all that is sold. . . . Economically if the firm were to begin to restrict output so as to gain monopoly profit, it would cease to sell 99.9 percent of the output or even anything at all. Consequently, it would not attempt to do so, but would find its maximum advantage in behaving like a pure competitor."

variety of legal and some economic barriers which limit the actual and potential competitiveness of the markets for many local telecommunications services.

Perhaps not all of these barriers can (or should)[24] be removed. Some are probably not remediable — if economies of scale loom large relative to the size of a market, there is presumably little to be done. In any event, one cannot reasonably rely on competition to discipline the incumbent's prices if the scope of competition is largely limited. The barriers may include, *inter alia*, legal barriers to market entry and exit in the form of restrictive franchises, legal prohibitions of product and service offerings by particular carriers, and discriminatory access provisions for access to rights of way. Nonlegal barriers to competition may include the failure to unbundle competitive services from noncompetitive ones and the lack of number portability.[25]

While these barriers may circumscribe the feasibility of effective competition, it is frequently, conveniently forgotten that several important factors simultaneously operate strongly to promote competition. Restraints that inhibit competition may be artificial, but so too are the plethora of regulatory policies which create the uneconomic rate structures and disparate social support burdens that currently prevail and create such ripe targets for selective market entry. A genuinely fair and discriminating test of competition's strength and viability presumptively requires that *both* kinds of artificialities be removed. Removing one set, but not the other, will prevent regulators and policymakers from accurately assessing the true extent of self-policing competition.[26] Handicapping is simply a tool of cartelization. Regulators may be able to use this

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[24] The costs of reducing some barriers may not be worth the benefits. Indeed, the costs of reducing some barriers may actually consist in the creation of barriers to entry into other product markets. For example, removal of barriers to entry into markets for some existing services may involve creation of barriers for creation of new products by making it difficult to appropriate the rewards from invention and innovation. *See* Harold Demsetz, "Barriers to Entry," *American Economic Review* (March 1982).

[25] Note that number portability requires intelligent network capabilities and raises competitive issues primarily for local services — rather than interstate services.

[26] It is a familiar old chestnut of second-best welfare theory that, when all conditions for optimality cannot be satisfied, achieving any one may not lead to a welfare improvement. Thus, if incumbents are going to be subjected to a variety of unwarranted handicaps, there would appear to be no principled basis for opposing compensating departures from purity when it comes to otherwise optimal policies that favor competition (*e.g.*, unbundling). In espousing regulatory reform, Baumol and Sidak (pp. 140-141) explicitly refer to second-best considerations:

(continued...)

tool to create the *appearance* of competition, but it cannot produce the *reality* of vigorous competitive rivalry. Only the reality of vigorous competitive rivalry provides the desired incentives to improve efficiency and accelerate innovation. Regulatory handicapping, on the other hand, leads to fierce battles in the regulatory arena and inefficiency in the marketplace.

The removal of uneconomic barriers (as well as inducements) does not translate automatically into effective competition; it translates into an opportunity for self-policing competition to evolve. A conclusion that competition is effective in any particular market will ultimately reflect the existence of actual competitors competing successfully. Competition in this sector of the economy generally requires significant investments in specialized (*i.e.*, non-salvageable) capital assets. Hence, (a finding of) effective competition probably will require not only that the market is reasonably contestable, but also that a significant portion of the market is *actually* contested.[27] Even if removal of barriers to competition were genuinely sufficient to guarantee effective competition, we doubt that regulators and public policymakers would be willing to streamline regulation in the absence of *actual* competitors competing successfully. Actual competitors may not be necessary to effective competition (although, in our view, they probably are), but they are probably necessary to provide policymakers with credible authentication of the existence of effective competition.[28]

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[26](...continued)
Socially optimal regulation of local telephony is composed of a number of parts, and those parts can serve their purpose *only* if they are adopted and carried out together. Execution of only a few of the optimality rules does not guarantee even an improvement in economic efficiency because of the proposition in economics called the theorem of the second best.

[27] If significant portions of a market are actually contested, quasi "hit-and-run" entry may suffice to constrain behavior in market segments not actually contested. When capital resources have been deployed, their plausible extension or redeployment may provide a credible competitive deterrent.

[28] As noted above, this should not foreclose various forms of pricing flexibility. Removing barriers may not guarantee effective competition, but it does imply that the potential for harm is lessened compared to a situation where barriers continue to exist. As the potential for harm is reduced, the scope for discretion should presumably be expanded. Failure to afford such relief may itself inhibit effective competition.

## B. Metrics: Sales Versus Capacity Deployment

While we believe competitors will need to win battles in the marketplace for the reality of competition to be credibly manifested to regulators, we think it would be a grave error for policymakers to specify, in advance and effect, the number of battles competitors must win to trigger regulatory relief. Once the number of battles new competitors must win is specified (via a market-share trigger), their winning or failing to win that number of battles may actually signify little from the standpoint of competition. If the regulator, in effect, says to an incumbent, "you must lose 30 or 40 percent of your market share," that is precisely what the incumbent may then set out to do — *by not competing as strenuously as it might otherwise have competed.* Rather than promoting or signifying more vigorous competitive rivalry, a share trigger rewards and thereby encourages noncompetitive behavior.

At the same time, a new competitor, upon approaching the trigger market share in any particular market, may find it advantageous to focus its competitive efforts elsewhere to avoid triggering regulatory relief for the incumbent. The incentives to engage in this kind of strategic behavior would be particularly strong were the incumbent's pricing flexibility tied to its market share, as is advocated by the CAPs. The problem of inefficient behavior prompted in response to a policy signal is a quite general problem: when a signal is specified, people respond to and "game" the signal, often with adverse consequences.[29]

One putative advantage of specifying a share trigger in advance is that it might avoid backsliding behavior by the policymaker. Long-distance provides an illustration. At one time, 70 percent was deemed and espoused by many of AT&T's competitors to constitute an appropriate share trigger for deregulation of AT&T, much as the CAPs now call out a variety of share losses with which they suggest they would be "comfortable." In the case of AT&T, as the

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[29] On the economics of signaling, *see* Michael Spence, *Market Signaling* (1974). The specific disabilities of market share/concentration ratio measures as policy signals were one of the principal criticisms leveled against the failed industrial deconcentration legislative proposals that surfaced in the 1970s. Those proposals called for the breakup of firms with large market shares in concentrated industries. Rather than promote competition, such laws would likely have discouraged it by providing disincentives for firms to compete and grow.

elevator descended and passed through the 70th floor, the appropriate share trigger was revised downward and has continued to fall as AT&T's share has fallen.

Against this putative advantage of setting a trigger are three, in our view, more-than-offsetting sources of disutility:

(1) Any benchmark will be inherently arbitrary and have, at best, a tenuous foundation in legal and economic analysis. Consider, for any suggested trigger configuration of market shares, single-point revisions of the share triggers. The notion that a particular market is competitive, given the initial configuration, and is not with single-point revisions is obviously ludicrous and intellectually indefensible. When CAP spokespersons opine to the effect that they would be "comfortable" with incumbent share losses of a particular magnitude, should this be interpreted as a statement of merely sufficient conditions? And presuming so, ought not a policy trigger be set to reflect minimum *necessary* conditions as opposed to merely *sufficient* ones? What competitive significance does a particular configuration of market shares possess when it reflects the market response to a heavily politicized, highly inefficient rate structure?

(2) If a trigger were specified, there would be heavy pressure to disarm it when the day of reckoning dawned, so any utility hypothesized for automaticity would likely prove illusory in the event. There is, in reality, no way a credible commitment can be made to honor a particular trigger. There is no Doomsday-like device which is incapable of being disarmed. In the event, what will happen is what has always happened — the weakest competitors will argue that, without their survival, "competition" is at risk and, therefore, handicapping (*i.e.*, cartelization) is needed now more than ever.

(3) If a trigger is specified, both entrants and incumbents can be expected to respond to whatever the trigger is, so that its meaning and utility as a gauge of competition will be heavily compromised. If the regulator's object is *really* to learn whether markets can be self-policing, as opposed to simply seeing whether the *illusion* of competition in the form of some esteemed configuration of market shares can be synthesized, he or she should not, in effect, prejudge results. *Competition is a process for discovering the identity of efficient service providers.*

As an alternative to a share trigger, we would advocate that regulators focus on the deployment of productive capacity as tangible proof of competition's reality and credibility as a control mechanism. Deployment of capacity provides a basis for evaluative measurement and,

because capacity additions are usually "lumpy," they may be utilized strategically to avoid policy triggers only with difficulty if at all.

### C. Geographic Scope of Markets

Relevant markets for analysis of local competition are (almost) self-evidently local markets. At any point in time, competitors will have entered some, but not all, local markets. At any point in time, they will serve part, but not all, of the metropolitan areas that they have entered. Obvious advantages accrue if the scope of streamlined regulation matches the actual geographic extent of competition. Without a fairly close match, no regulatory decision with regard to streamlining can be fully satisfactory. If regulation is *not* streamlined where it should be, there will be unnecessary regulation in the areas in which competition is effective. Such regulation can be costly to the public interest since resources are likely to be dissipated in unproductive regulatory skirmishes rather than in genuinely productive competitive endeavors. On the other hand, if regulation *is* streamlined in an area where competition is not uniformly effective, some customers may have neither adequate competitive alternatives nor sufficient regulatory protection.[30]

Our own view is that telephone regulation can be effectively streamlined in relatively small geographic areas without severe administrative difficulties. CAPs currently operate in about 50 cities. Thus, there would appear to be a fairly limited number of areas where petitions for streamlining would likely be credible — even as the scope of competition expands over the next several years. The Commission would, however, need to develop guidelines that allow it to make decisions quickly for individual areas.[31]

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[30] Although substantial economic advantages accrue if regulation is streamlined in small geographic areas, administrative difficulties may be of concern. The FCC's recent experience in cable regulation amply demonstrates the problems that can arise from attempting to administer regulation in numerous local areas.

[31] In *Regulatory Reform for the Information Age: Providing the Vision*, Strategic Policy Research recommended that the Commission initiate a generic proceeding to establish precisely such guidelines.

The geographic expansion of CAPs has not followed any simple rules other than the pursuit of traffic density.[32] CAPs typically serve the Central Business District (CBD) of significant urban areas. However, they also often provide service on major arteries going out to the suburbs (where IXC points of presence frequently reside). They also sometimes provide service in so-called "edge cities." For example, MFS provides service in downtown Bethesda, Maryland, where our own business is located.

Generally, these smaller areas (*e.g.*, CBDs) more closely approximate the relevant markets for streamlining than larger areas [*e.g.*, Metropolitan Statistical Areas (MSAs)]. In our opinion, no Census-defined area provides a good approximation for the extent of CAP competition. Furthermore, to the best of our knowledge, no geographic areas defined by private companies (*e.g.*, Rand McNally or Donnelly) provides a good approximation.

For this reason, we believe that the best approach is to let telephone companies (or others — *e.g.*, customers frustrated by their inability to exploit the existence of competitive alternatives effectively) define the areas that they think are potential candidates for streamlined regulation. The Commission could provide guidelines for defining relevant areas. For example, it might require that a single relevant market consist of contiguous areas. The company would then have to show that *within the candidate area*, the conditions for effective competition are met. For administrative ease, the conditions should be verifiable facts — not vague arguments about competitive rivalry.[33]

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[32] In its Comments in RM-8356, MFS Communications Company, Inc. (p. 2) characterizes itself in these terms: "As an integrated telecommunications company, MFS provides a wide range of high quality voice, data and other enhanced service and systems *specifically designed to meet the requirements of communications-intensive business and government end users*" (emphasis added). Hyperion of Tennessee recently began construction of a 154-mile fiber-competitive access network in Nashville "to provide dedicated, private line service to business and govt. users." *See Communications Daily* (3/22/94, p. 8).

[33] To be sure, any standard based solely on verifiable facts would be an imperfect standard for effective competition. However, perfection is not the issue. The objective is to define a standard that can be carried out with the Commission's administrative resources and yields good decisions most of the time.

## D. Comparative Analysis of Alternative Market Definitions

Comparative approaches to geographic market definition can be illustrated with reference to a hypothetical regional area. Figure 1 depicts a CAP network . It includes a large central area (W) that is largely contiguous with the central business district (CBD). In addition, the network fans out and includes segments X, Y, and Z in edge cities.[34] Such a CAP network could reach customers who account for tens — perhaps hundreds — of millions of dollars of access revenues. Suppose that a test for effective competition is applied to the MSA as a whole. If the test is *not* satisfied, LECs' competitive responses are effectively limited by regulatory rules and a substantial amount of business may be at risk because access prices are inflated by regulatory subsidy and price-averaging mechanisms. In these circumstances actual losses of business are as much a product of regulation as of competitive prowess. The CAP has limited competitive incentives to improve efficiency, because the LEC is handicapped in competing. The LEC has little incentive to improve efficiency because it is handicapped in competing — its ability to translate efficiency to effective competitive effect is substantially diluted. To be sure, the CAP is enriched. However, the lost LEC revenues must either come from monopoly ratepayers (in the rest of the MSA or elsewhere) or from the LEC. The former may be unfair to the monopoly customers. The latter diminishes the LEC's ability to raise capital and its incentives to invest in infrastructure.

Suppose whatever test for effective competition is specified in the MSA is satisfied. In that case, customers in the areas within the MSA not served by CAPs have neither competitive alternatives nor regulatory protection.

A competitive test will work somewhat better if applied to smaller geographic areas. Consider the Central Business District (CBD) as an appropriate market for streamlining. As illustrated in Figure 2, satisfying the specified criteria would allow streamlined regulation within the CBD. However, it would not allow streamlined regulation in the "edge cities;" *i.e.*, X, Y and Z. In general, the CAP would be free to compete in both the CBD and the "edge cities," while

[34] Note that W, X, Y, and Z represent the limits of the CAP serving area. They do not necessarily correspond to LEC wire centers, to city limits, or to any Census-defined areas.

the LEC would be handicapped and need to overcome regulatory limits on its competitive responses in the latter. Thus, this approach does not provide a satisfactory competitive environment outside the CBD. That may be a fatal defect, since today a sizable and growing fraction of business activity is conducted outside CBDs.

Figure 3 illustrates the effect of applying the competitive test on a wire center basis.[35] For simplicity, we assume that the MSA consists of 25 equal areas, each served by a different wire center. As the figure shows, the regulatory test is much better matched to the areas of competition. In particular, regulation might be streamlined in areas A1, B3, C3, D4 and A5, which account for most of the competition. Nevertheless, the match between wire centers and areas of competition is still far from perfect. In particular, customers in nearby areas may be feasibly addressed by CAP capacity, but those areas are nevertheless not counted as competitive.

Allowing LECs (and other interested parties) to nominate areas that are appropriate candidates for streamlining could address this problem (see Figure 4). The LEC-defined areas need not correspond precisely to wire centers. They might include both areas that are served by CAPs and areas that are not. In any event, the LEC would need to show that its candidate geographic area, *considered as a whole*, passes the test for effective competition. This approach avoids a mismatch between the areas of streamlined regulation and the areas of competition. The LEC has the incentive to include as much of the competitive areas as possible. The regulator can ensure that the areas are not overly broad by appropriately defining the standard for effective competition.

This approach may also possess a further potential advantage. The LEC would presumably define areas that are easy for customers to understand and that do not appear arbitrary. For example, the area for streamlining might be within the city limits of a particular edge city. That would be much more acceptable to customers than distinctions based on the first three digits of the telephone number assigned by the telephone company.

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[35] If a CAP collocates at a particular wire center, it can reach all the customers served by that wire center. Thus, the area served by the wire center seems the relevant geographic market for switched transport competition.

Relevant geographic markets are harder to define with respect to end-to-end bypass; *i.e.*, from the end user to the interexchange carrier.

## E. Capacity Metric

To be in a position to gauge the extent of effective competition and, hence, the reasonability of its (their) regulation, the FCC (or state commissions, where relevant) need(s) to require CAPs to disclose the geographical extent and capacity of their networks on an annual basis. That is, each year CAPs should be required to provide a list of the city blocks which are passed by their networks and the technical characteristics of the facilities deployed. This information would be used by telephone companies (and possibly others) to develop petitions for streamlined regulation and by regulators to evaluate such petitions and the state of competition generally.

Suppose that a telephone company wants to petition for streamlined regulation in a particular area. It would then identify the blocks within that area that are feasibly served or addressed by competitors. It would then calculate the ratio of access lines within those blocks to total access lines within the area. The test would be whether that ratio and the number of competing firms are great enough to constitute effective competition.

The information provided by CAPs and telephone companies would be subject to audit by the Commission. There should be appropriate penalties for misrepresentation by either party.

## F. Standards for Effective Competition

If the geographic areas are small, we believe that the standard for effective competition can be relatively low; *e.g.*, 25 percent of demand in areas easily addressed by competitors.[36] The reason is that, within such small areas, it is plausible that CAPs could readily and quickly expand to the remaining parts of the area if demand warranted such expansion. For example, MFS currently serves the building next door to the one in which our business is located. That service could obviously easily (and presumptively) be expanded to our own and other nearby locations. The definition of "nearby" is a matter of judgment and would need to be specified, but it should

[36] If larger geographic areas are defined as competitively relevant, the percentage of capacity deployment will need to be larger. The fact that 25 percent of the access lines in a large region could be potentially served would not imply the effectiveness of competition throughout the region, if the installed capacity were primarily located in one particular area of the region.

be possible for the regulator to determine a workable definition and make reasoned judgments. The ability of CAPs readily to expand within a delimited area provides strong incentives for the telephone company to provide high-quality service at reasonable prices *throughout the specified area*. These incentives thus argue for an expanded zone for presumption of reasonableness and for pricing discretion (*viz.*, streamlining).

The approach we propose would, in operation, be similar to the process of defining a relevant market in an antitrust litigation. Instead of focusing on the geographic or product space within which anticompetitive behavior is alleged to occur or be likely, the analytical focus would be on the definition of a geographic area and range of services within which anticompetitive behavior is not feasible given the availability of substitute alternatives to customers (*i.e.*, a relevant market within which competition can be relied upon to compel pricing within the zone of reasonableness described earlier and wherein an expanded presumption of reasonableness should, therefore, govern).

## G. Treatment of Services

In petitioning for streamlined regulation within a particular area, the telephone company would need to specify the services for which it requests streamlined regulation. In general, a service should be streamlined only if competitors offer a like service at a price that is comparable or lower than the regulated price for that service. This determination would be relatively straightforward with regard to services offered by fiber-based CAPs. However, adjustments for quality differences would need to be made with regard to wireless-based competitive services.[37]

Under the approach we propose, particular markets/services would be removed from price caps upon successful petition of a telephone company. The price-cap constraints for the remaining baskets would be adjusted to reflect that they now contain fewer markets/services than before.

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[37] *See Regulatory Reform for the Information Age: Providing the Vision* for further discussion of quality adjustments.

## IV. Conclusion

Our analysis of local service metric issues yields five principal conclusions:

(1) Contrary to CAP opinion, the appropriate scope for pricing flexibility does not turn in any significant way on the scope or intensity of competition. The zone of reasonableness for pricing flexibility is defined in terms of efficiency norms based on behavior under idealized (rather than actual) conditions of competition. The degree of effective competition in a market determines the extent to which enlightened regulation is required to ensure pricing within the zone of reasonableness. The actual degree of competition plays virtually no role in defining the reasonable scope for pricing flexibility.

(2) We recommend that the FCC take the following steps to increase pricing flexibility for LECs within the zone of reasonableness. Note that these recommendations are intended to increase flexibility in markets that are *not* yet effectively competitive.

   a. Bands and baskets should be considered guidelines — not absolute limits on pricing flexibility. They should continue to limit what LECs can do without making detailed regulatory showings However, the FCC should facilitate filings of reasonable rates which are outside the bands and/or baskets. The FCC should also facilitate filings for geographically deaveraged rates. In such filings, the LEC would have to demonstrate that the proposed rates continue to satisfy the overall price-cap constraint and are within the zone of reasonableness.

   b. The basket structure should be simplified. Ideally, there should be only a few well-designed baskets and no sub-baskets.

   c. Bands should be widened to allow greater downward pricing flexibility.

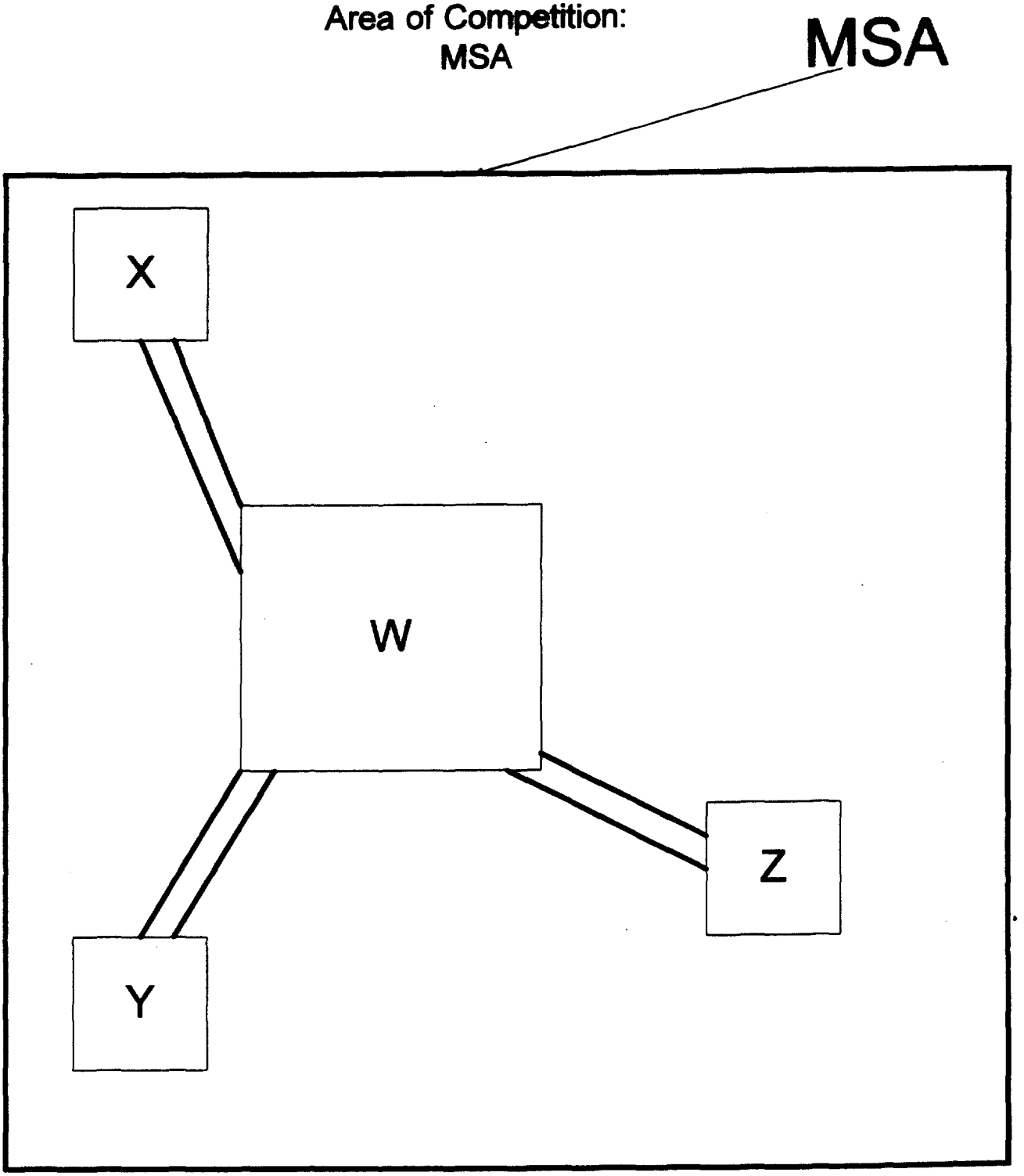
(3) Symmetrical removal of *both* artificial barriers *and* inducements to competition is required to implement a fair test of competition's scope and effectiveness.

(4) Deployment of capacity provides a metric for gauging the degree of effective competition. That metric is markedly superior to market share. Use of market share triggers represents the antithesis of competition. Cartelization through handicapping can produce only the illusion of competition — not the reality of vigorous competitive rivalry.

(5) Under the approach we espouse, the Commission would entertain petitions from interested parties which specify geographic product markets relevant for regulatory streamlining. Candidacy for streamlining would be premised on the existence of competitive productive capacity sufficient to support an expanded presumption of reasonability for pricing changes. When the Commission judges that there is sufficient evidence to support the grant of such a petition, price-cap indices would then be revised to reflect removal of streamlined service markets.

# Figure 1

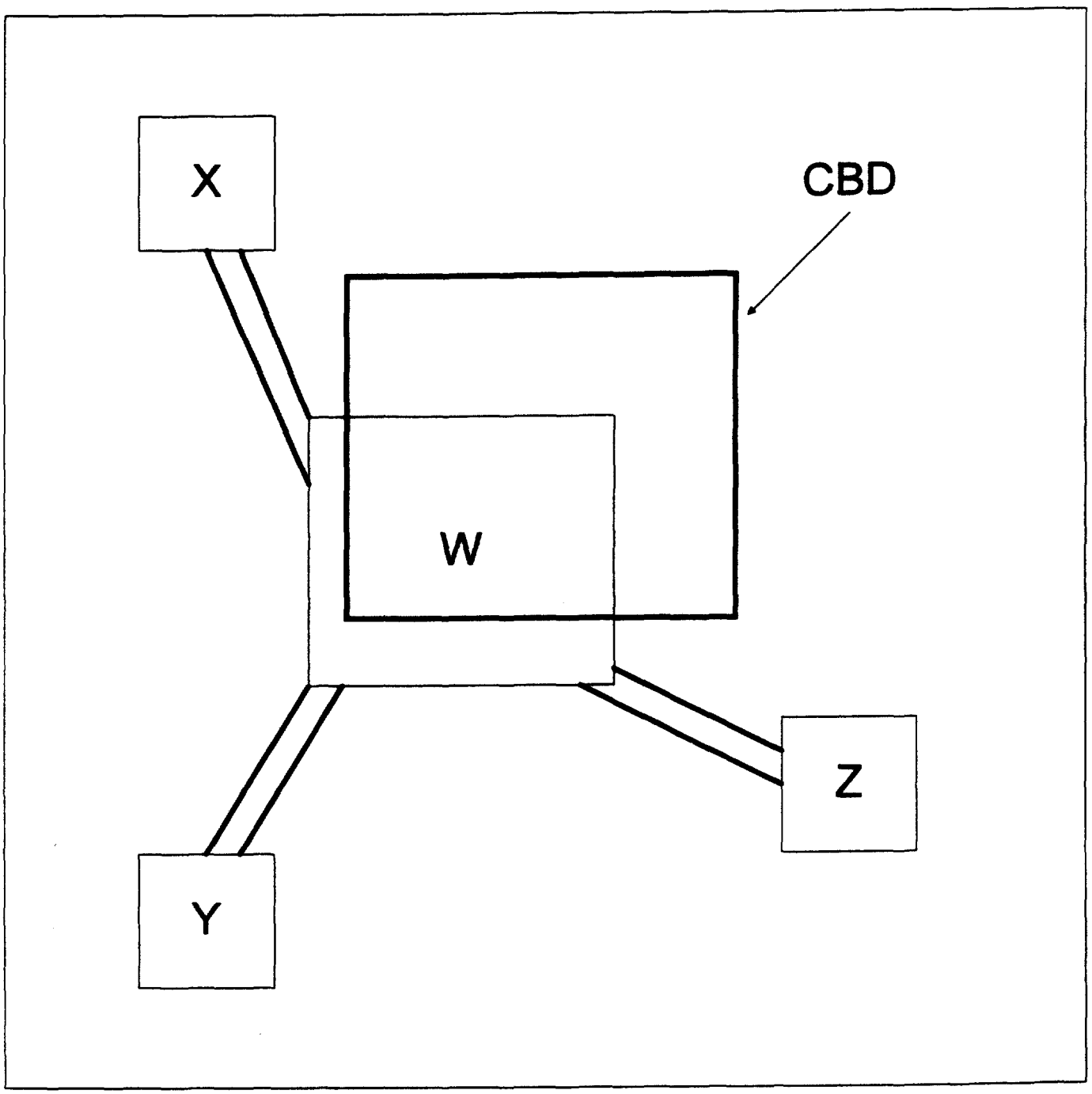
Area of Competition:
MSA




CAP Network = W, X, Y, Z and connecting links

# Figure 2

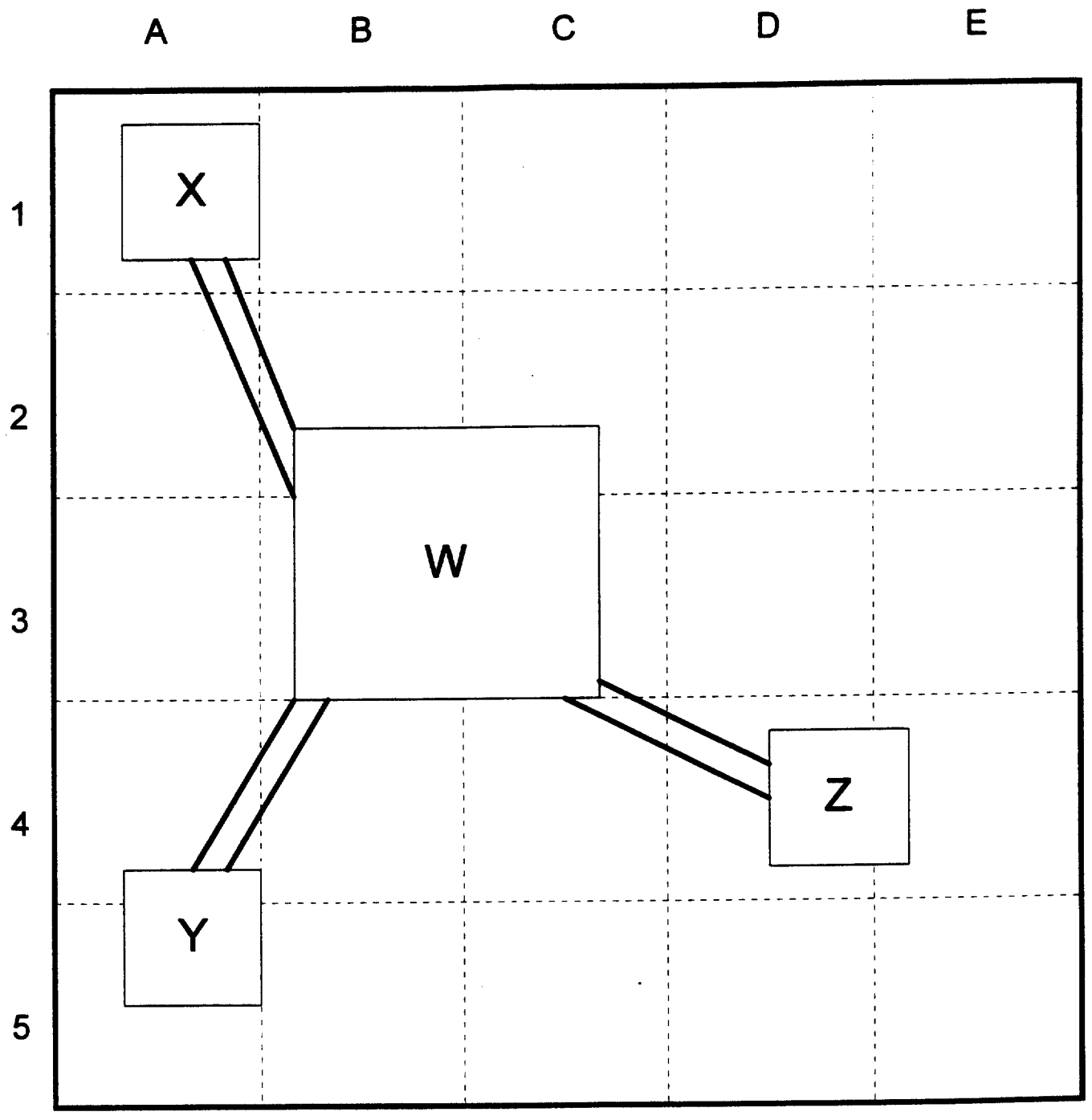
Area of Competition:
CBD




CAP Network = W, X, Y, Z and connecting links

# Figure 3

Areas of Competition:
Wire Centers

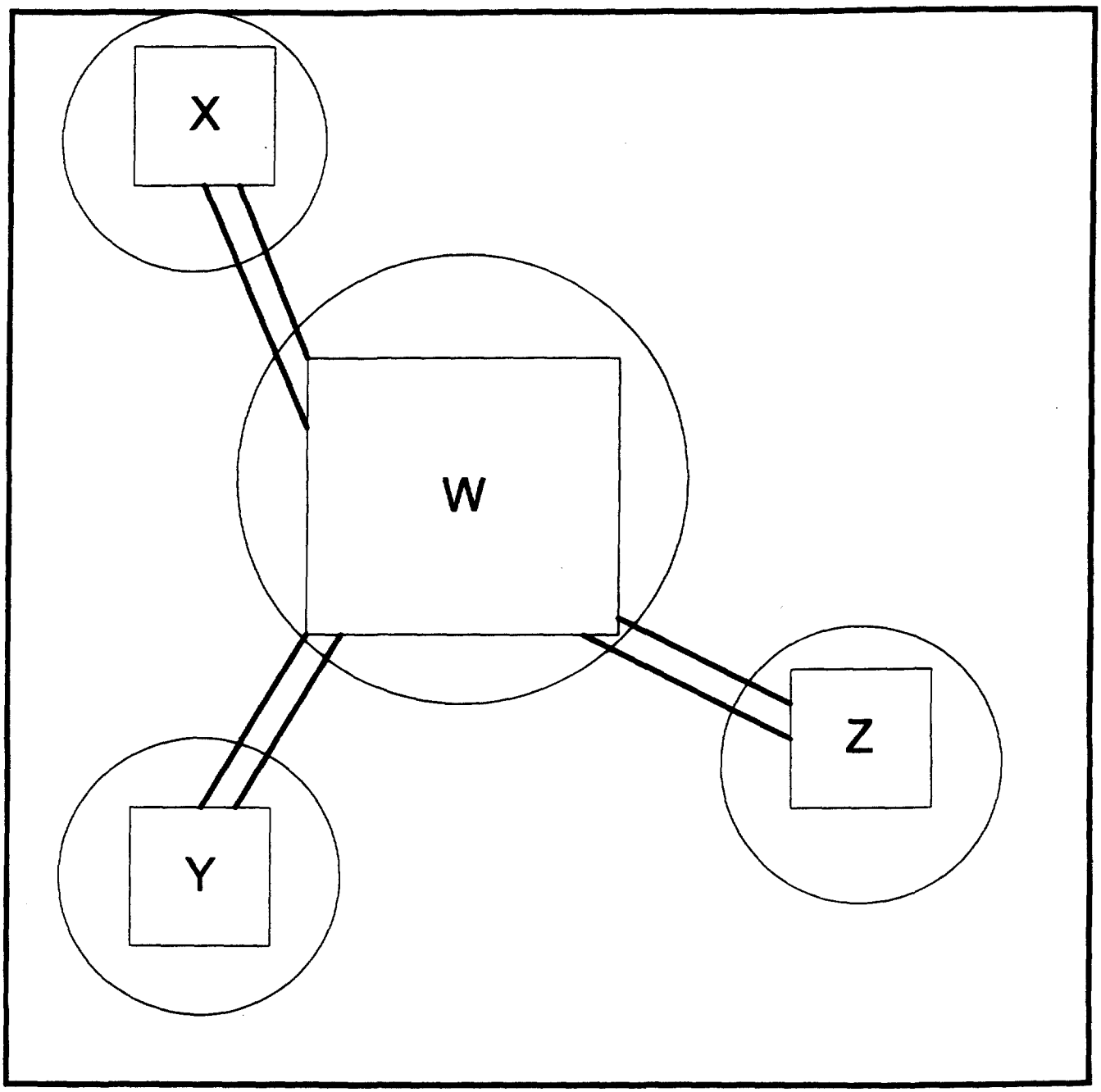



CAP Network = W, X, Y, Z and connecting links

Wire centers outlined by dotted lines

# Figure 4

Areas of Competition:
LEC-defined Areas




CAP Network = W, X, Y, Z and connecting links
Circles denote LEC-defined areas

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# Attachment A

## Curriculum Vitae

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**ATTACHMENT A**

**JOHN HARING**

Received a B.A. with highest honors from the University of Virginia, where he was awarded the John R. Williams Prize as the outstanding honors graduate in the class of 1968, and M.Ph. and Ph.D. degrees in economics from Yale University. He was a Woodrow Wilson Fellow, held a Yale University Fellowship, a Brookings Research Fellowship and is a member of Phi Beta Kappa. His areas of specialization are industrial organization, regulated industries and monetary theory. He was a lecturer and teaching assistant at Yale University and an Adjunct Professor at the University of Maryland.

He served as Chief Economist at the Federal Communications Commission and Chief of the Commission's Office of Plans and Policy. At the FCC, he was a leading exponent of incentive regulation and pricing freedom for telephone companies operating in competitive environments. He was a chief architect of the Commission's price-cap regulatory reform plans as well as its efforts to strengthen resource rights in the electromagnetic spectrum and in broadcast programming.

Prior to his six years at the FCC, he was Visiting Professor of Economics at the University of Virginia, worked as a private economic consultant and served consecutively on the staffs of the Federal Trade Commission's Bureau of Economics, the Civil Aeronautics Board's Office of Economic Analysis and the U.S. Department of Justice's Economic Policy Office. He has prepared papers and reports on a wide range of subjects including telecommunications economics and regulation as well as accounting standards, conglomerate mergers, energy policy and resources and the OPEC cartel.

His articles have been published in the *Journal of Business, Land Economics, The American Economic Review, The Wall Street Journal*, the *IEEE Proceedings*, the *Federal Communications Bar Journal* and the *Annals of the Institute of Public Utilities*. He is the author of five papers in the FCC's Office of Plans and Policy Working Paper Series and the "Telecommunications" entry in the *Fortune Encyclopedia of Economics*. In addition to his work for clients in the private sector, he has served as a consultant to the Iowa Utilities Board and the United Kingdom's Office of Telecommunications.

## EDUCATION

YALE UNIVERSITY
Ph.D., Economics, 1975

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## EMPLOYMENT

STRATEGIC POLICY RESEARCH, INC. (SPR)--Bethesda, Maryland

1992- *Principal.* Economic policy research for a variety of clients in the broadcasting and telecommunications industries.

NATIONAL ECONOMIC RESEARCH ASSOCIATES, INC. (NERA)--Washington, D.C.

1990-1992 *Vice President.* Economics and public policy consulting services for a variety of clients in the telecommunications industry.

FEDERAL COMMUNICATIONS COMMISSION--Washington, D.C.

1989-1990 *Chief Economist.* Economic policy analysis and evaluation for the Chairman of the Federal Communications Commission.

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FEDERAL COMMUNICATIONS COMMISSION--Washington, D.C.

1983-1989 *Chief* (1987-1989). Management of and participation in the development of national regulatory policy in the communications industry.

UNIVERSITY OF VIRGINIA--Charlottesville, Virginia

1982-1983 *Visiting Professor of Economics.* Taught courses in microeconomics, industrial organization, regulation, statistics and econometrics.

GLASSMAN-OLIVER ECONOMIC CONSULTANTS, INC.--Washington, D.C.

1979-1982 *Vice President.* Microeconomic analysis of regulatory and competition policy issues for many of America's leading corporations.

ANTITRUST DIVISION, ECONOMIC POLICY OFFICE
U.S. DEPARTMENT OF JUSTICE--Washington, D.C.

1979-1979 *Senior Staff Economist.* Competition policy analysis of issues related to the energy industries.

OFFICE OF ECONOMIC ANALYSIS
CIVIL AERONAUTICS BOARD--Washington, D.C.

1977-1979 *Senior Staff Economist.* Economic analysis of competition policy issues related to regulatory reform in the air transportation industry.

BUREAU OF ECONOMICS, DIVISION OF INDUSTRY ANALYSIS
FEDERAL TRADE COMMISSION--Washington, D.C.

1972-1977 *Senior Staff Economist.* Economic analysis of competition and regulatory policy issues in the transportation, energy and communications industries.

## PROFESSIONAL ACTIVITIES

Member, Western Economic Association
Member, American Economic Association
President and Chairman of the Board of Directors, Telecommunications Policy Research Conference (TPRC), 1992-1993
Treasurer and Secretary, TPRC, 1991-1992

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